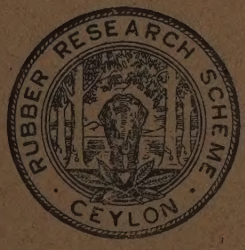
Vol. 23 Parts 1—4.

Rubber Research Scheme (Ceylon)

17

Combined Quarterly Circulars for 1946



December, 1946

H. W. CAVE & CO. COLOMBO

Rubber Research Scheme (Ceylon).

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NOTICES

DARTONFIELD ESTATE — VISITORS' DAY

The services of technical officers are available to visitors on the second Wednesday in each month; the estate superintendent is available every Wednesday. Visitors are requested to arrive on the estate not later than 9-30 a.m.

Visitors will be welcomed at the station on other days provided an appointment has been made in advance.

Dartonfield Estate is situated about 3½ miles from the main Matugama-Agalawatta Road, the turn-off being near culvert No. 14/10. The distance from Colombo is approximately 47 miles.

PUBLICATIONS

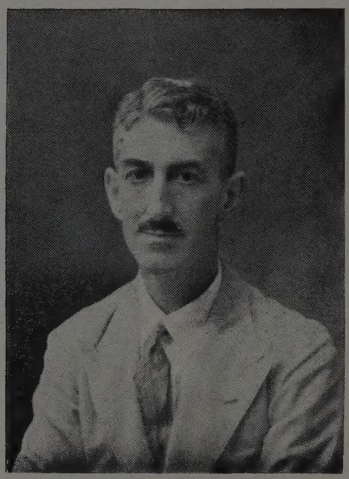
Rubber Research Scheme publications comprising Annual Reports Quarterly Circulars and occasional Bulletins and Advisory Circulars are available without charge to the Proprietors (resident in Ceylon), Superintendents and Local Agents of Rubber estates in Ceylon over 10 acres in extent. Forms of application for registration may be obtained from the Director. Extra copies of publications can be supplied to the Superintendents of large estates for the use of their assistants.

ADVISORY CIRCULARS

The undernoted Circulars may be obtained on application at 25 cents per copy. Future issues in the series will be sent free of charge to estates registered for the receipt of our publications:—

(1) Notes on budgrating procedure (revised June, 1943).
(3) Notes on Rubber seedling nurseries. (Revised September, 1943).
(4) Contour lining holing and filling, cutting of platforms, trenches and drains (revised June, 1943).
(5) Straining box for latex (January, 1940).
(6) Notes on the care of budded trees of clone Tjirandji 1 with special reference to wind damage (September, 1938).
(8) Planting and after-care of budded stumps (revised June, 1943).
(10) Root disease in replanted areas (August, 1939).
(14) Rat Control (September, 1940).
(16) Increasing the crops from Ceylon Rubber estates (January, 1942) and two Supplements.
(17) Tapping young budded trees (May, 1942) and two Supplements.
(18) Rubber manuring under wartime conditions. (November, 1942).
(19) Density of Planting and Thinning-out, (December, 1942).
(20) Planting material recommended for use (1944). (Revised May, 1944).
(21) The Control of Bark Rot and Canker. (April, 1944).
(22) Oidium Leaf Disease. (April, 1944) and two Supplements.
(23) Uniformity in the Nomenclature of Clones and Clonal Seedlings. December, 1944).
(24) Treatment of Brown Bast. (December, 1944).
(25) Ground Covers. (January, 1945).

RETIREMENT OF MR. T. E. H. O'BRIEN



Mr. T.E. H. O'Brien was appointed Chemist to the Rubber Research Scheme in 1921 and later became Chief Technical Officer. The Rubber Research Scheme (Ceylon) was constituted in 1930 by Ceylon Ordinance, Chapter 302, and the new Board of Management took over the staff and assets of the former Research Scheme. Mr. O'Brien was appointed Director in 1932 in competition with a large number of overseas candidates. He resigned his post in July, 1946 owing to ill-health.

FIELD EXPERIMENTS ON DARTONFIELD ESTATE—XXIX

COMPARISON OF TAPPING SYSTEMS.

C. A. de SILVA, *Acting Botanist*

The results of the ninth year of experimental tapping are presented in this paper, with a summary of the results of the previous 8 years. Comments on the results of previous years and a description of the experiment will be found in the following publications :—

1. *Second Quarterly Circular for 1939*, Vol. 16, Part 2.
2. *Third Quarterly Circular for 1940*, Vol. 17, Part 3.
3. *Third Quarterly Circular for 1941*, Vol. 18, Part 3.
4. *Combined Quarterly Circulars for 1942*, Vol. 19, Parts 1-4.
5. *Combined Quarterly Circulars for 1943*, Vol. 20, Parts 1-4.
6. *Combined Quarterly Circulars for 1944*, Vol. 21, Parts 1-4.
7. *Combined First and Second Quarterly Circulars for 1945*, Vol. 22, Parts 1-2.

Experimental Details

THE treatments consist of 11 tapping systems randomised in each of 6 blocks in 2 fields of mature seedling Rubber planted in 1913, and 1917. All the blocks have been manured under a biennial scheme of manuring on Dartonfield Estate. In June 1945, 8 per cent of the total number of trees in this experiment were uprooted by a storm and yields from that date have been based on the average yield of trees remaining in the plots, consequently the yield data of the ninth year of tapping are not considered up to the standard of accuracy of previous years.

The results are presented as in previous papers. The preliminary yields of plots recorded in 1936-37 and the experimental yields for the tapping year 1945-46 are given in Table I in kilograms per plot of 30 trees. The table also includes the experimental yields corrected for differences in initial yields, and the percentage scrap yields for the tapping year.

Table II gives the yields for the nine years expressed as a percentage of the control system No. 1, and the average percentage yields for the whole period of nine years.

There is little change in the yields of the tapping systems of 67 per cent intensity compared with yields in former years. These systems of reduced intensity can be expected to yield about 80 per cent of the control (S/2, d/2, 100%). The average figures for the nine year period confirm this view.

System No. 3, the half spiral alternate daily on alternate sides, maintains its apparent increased yield over the control in the ninth year.

Systems 4 and 5 both give lower yields in 1945/46 than in the previous year. Apart from the fact that such fluctuations can be expected from year to year, the experiment has now reached a stage, when the cycle for renewal of bark is being completed and yields are influenced somewhat by the heights of tapping cuts. System No. 5, the double four, still maintains an apparent increased yield over the period of nine years compared with the control system No. 1, the alternate day half-spiral.

System No. 8, double-three, shows a further drop in yield from 111.4 to 101.8 per cent of the control (S/2, d/2, 100%). Owing to the abnormally high rate of bark consumption which prevailed before the experiment started it was not practicable to make the opening height for each system strictly proportional to the rate of bark consumption for that system. For example, opening new cuts at 30 inches in the double-three system actually allowed a shorter time for renewal than opening at 27 inches in the control system. When comparing the yields of the two systems we have to consider the possible influence of differences in the average height of tapping cut and in the maturity of the bark. Interpretation of the recent drop in the relative yield of double-three is therefore complicated by the fact that the bark now being exploited is somewhat less mature in the double-three than in the control trees. It is important to notice that the fall in relative yield of double-three has not been accompanied by a marked drop in dry rubber content (Table III) compared with the control or double-four system. The results of the final year ending February, 1947 may show whether the 1945-46 drop in yield of double-three marks the beginning of a real deterioration. Meanwhile we can say that over a period of 9 years the yield of the double-three plots is 17 per cent in excess of the control, a figure which is statistically significant.

Systems 10 and 11. The shorter cycle of periodic rest of 4 months in 12 in system 11 still maintains an apparently higher yield than in system 10 of 6 months in 18.

Dry Rubber Content.—In Table III the dry rubber content figures of 1945-46 show some differences which are statistically significant, but the general level for all systems can be considered satisfactory.

Bark Renewal.—As in previous years bark renwewal measurements were made in the more important tapping systems. The figures given under show that bark renewal in the various systems still remains satisfactory.

Tapping Systems	Average bark thickness in mms. (12 months renewal)
1. S/2, d/2, (2x6m/12), 100%	6·5
2. S/2, d/2, (2x6m12), 12m/18, 67%	6·5
4. S/4//S4, d/2, (2x6m/12), 100%	6·6
5. 2S/2, d/4, 100%	7·1
6. 2/S2, d/3, 133%	6·9

Brown Bast.—The total number of Brown Bast cases is given in Table IV. The cases of Brown Bast have considerably increased in 1945-46. There is a clear indication that the less intensive systems have resulted in a lower incidence of Brown Bast.

A detail summary of Brown Bast cases in tapping and out of tapping is given in Table V together with the numbers of trees out of tapping from other causes. Trees tapped on a single cut which are out of tapping for a part of the year either before or after the change over of tapping panels are recorded as out of tapping for Brown Bast.

The cases of dry bark have also considerably increased in the more intensive systems in the ninth year. These may be potential Brown Bast cases which will presumably be accentuated in the future. Some of the blocks in this experiment have been in tapping for over 25 years and the question of bark reserves is now becoming an important factor.

TABLE I

Mean Yield In Kilograms of Dry Rubber per Plot of 30 Trees *

	Tapping Systems	Preliminary yields 1936-37 †	Experimental yields 1945-46	Adjusted yields 1945-46	Scrap as per cent of total 1945-46
Two-Day Series	1. S/2, d/2, (2×6m/12), 100%	66·6	73·5	71·2	6·9
	2. S/2, d/2, (2×6m/12), 12m/18, 67%	60·9	56·3	59·0	7·6
	3. S/2, d/2, (2×2d/4), 100%	64·1	76.8	76·7	7·0
	4. S/4//S/4, d/2, (2×6m/12), 100%	63·9	68·4	68·5	6·9
	5. 2S/2, d/4, 100 %	67·8	70·6	67·2	7·7
	6. 2S/2, d/4, 12m/18, 67%	62·3	59·1	60·5	6·2
Three-Day Series	7. S/2, d/3, (2×6m/12), 67%	63·3	62·7	63·2	6·6
	8. 2S/2, d/3, 133%	65 5	73·8	72.5	7·9
	9. 2S/2, d/3, 6m/12, 67%	59·0	54·2	58·5	6·6
	10. 2S/2, d/3, 12m/18, 89%	66·4	59·4	57·4	7·5
	11. 2S/2, d/3, 8m/12, 89%	63·6	65·6	65·8	6·5
	Mean	63·9	65·5	65·5	
	Standard Error			3·4	
	Sign. diff. (odds 19 : 1)				
	do *within* sub-blocks			9·6	
	do *between* sub-blocks			8·8	

* Approximate conversion to lbs. per acre (×7)

† Ten months' tapping only.

TABLE II

Adjusted Yields as Percentage of System No. I

	Tapping Systems	1937/38	1938/39	1939/40	1940/41	1941/42	1942/43	1943/44	1944/45	1945/46	1937/46
Sub-Block A Two-Day Series	1. S/2, d/2, (2×6m/12), 100%	100·0	100·0	100·0	100·0	100·0	100·0	100·00	100·0	100·0	100.0
	2. S/2, d/2, (2×6m/12), 12m/18, 67%	70·8	74·0	86·6	85·7	86·3	79·9	81·4	83.3	82·9	80.8
	3. S/2, d/2. (2×2d/4), 100%	110·4	108·6	109·3	111·6	105·9	114·4	105·5	108·0	107·7	109.1
	4. S/4//S/4, d/2, (2×6m/12), 100%	85·0	94·5	102·8	113·2	114·9	119·1	111·3	108·0	96·2	104.6
	5. 2S/2, d/4, 100%	96·8	105·7	107·4	115·2	106·9	112·1	105·6	100·5	94·4	104.7
	6. 2S/2, d/4, 12m/18, 67%	73·2	74·2	86·5	86·0	78·4	78·3	77·3	78·1	85·0	79.3
Sub-Block B Three-Day Series	7. S/2, d/3, (2×6m/12), 67%	67·8	71·2	79·5	85·7	80·2	77·1	79·9	83·4	88·8	78.9
	8. 2S/2, d/3, 133%	112·3	111·6	123·4	122·9	128·5	126·5	120·6	111·4	101·8	117.3
	9. 2S/2, d/3, 6m/12, 67%	69·0	73·6	82·1	85·1	83·6	79·0	76·1	78·3	82·2	78.3
	10. 2S/2, d/3, 12m/18, 89%	75·8	77·6	94·7	85·8	86·6	90·7	86·2	86·8	80·6	84.7
	11. 2S/2, d/3, 8m/12, 89%	81·0	89·0	101·0	99·5	97·9	96·3	95·8	102·3	92·4	94·2
	Mean	85·6	89·1	97·6	99·1	97 2	97·6	94·5	94·3	92·0	93·8
	Standard error	3·4	3·8	5·1	5·4	5·0	5·5	6·4	5·1	4·8	4·0
	Sign. diff. (odds 19 : 1)										
	do *within* sub-blocks	9·5	10·6	14·4	15·1	14·2	15·6	18·2	14·2	13·4	11·3
	do *between* sub-blocks	10·5	10·5	17·4	17·6	16·1	20·3	18·0	13·1	12·4	11·9

TABLE III

Dry Rubber Content Per Cent

	Tapping Systems	1937/38	1938/39	1939/40	1940/41	1941/42	1942/43	1943/44	1944/45	1945/46
Sub-Block A Two-Day Series	1. S/2, d/2, (2×6m/12), 100%	40·8	41·5	41·2	41·0	40·4	39·6	38·1	37·0	37·0
	2. S/2, d/2, (2×6m/12), 12m/18, 67%	40·5	41·4	40·8	40·5	40·0	39·3	38·7	38·0	37·4
	3. S/2, d/2, (2×2d/4), 100%	39·5	40·3	40·3	40·7	40·2	38·9	37·9	37·4	37·9
	4. S/4/S/4, d/2, (2×6m/12), 100%	40·8	42·2	41·6	40·9	39·8	38·5	37·2	36·6	37·5
	5. 2S/2, d/4, 100%	40·8	41·6	41·9	41·4	40·6	39·7	38·3	37·5	38·4
	6. 2S/2, d/4, 12m/18, 67%	40·9	41·3	41·3	41·3	40·6	39·7	39 0	37·9	37·7
Sub-Block B Three-Day Series	7. S/2, d/3, (2×6m/12), 67%	42·3	43·0	42·2	42·0	41·2	41·2	40·1	39·5	39·1
	8. 2S/2, d/3, 133%	40·6	41·0	41·1	41·3	40·2	38·8	37·0	37·6	37·9
	9. 2S/2, d/3, 6m/12, 67%	38·9	40·3	40·5	40·3	39·7	39·3	38·0	37·5	36·7
	10. 2S/2, d/3, 12m/18, 89%	40·1	40·8	40·5	40·7	39·6	39·1	37·4	36·6	36·7
	11. 2S/2, d/3, 8m/12, 89%	39·0	40·0	40·4	40·0	39·4	39·0	37'5	36·3	36·6
	Mean	40·5	41·2	41·1	40·9	40·2	39·4	38·1	37·4	37·5
	Error	0·51	0·46					0·47	0·53	0·55
	Sign. diff. (19 : 1 odds)			Not	Not	Not sig-	Not sig-			
	do *within* sub-blocks	1·4	1·3	significant	significant	nificant	nificant	1·3	1·5	1·6
	do *between* sub-blocks	1·4	1·4	,,	,,	,,	,,	1·3	1·5	1·5

TABLE IV

Number of Trees with Brown Bast

Tapping Systems	1938/39	1939/40	1940/41	1941/42	1942/43	1943/44	1944/45	1945/46
1. S/2, d/2, (2×6m/12), 100%	6	6	4	6	5	3	7	14
2. S/2, d/2, (2×6m/12),12m/18, 67%	0	2	3	3	5	3	4	7
3. S/2, d/2, (2×2d/4), 100%	3	5	8	8	8	6	8	15
4. S/4//S/4, d/2, (2×6m/12), 100%	2	4	7	7	10	5	13	22
5. 2S/2, d/4, 100%	3	5	11	12	7	6	8	20
6. 2S/2, d/4, 12m/18, 67%	0	4	1	3	5	2	5	6
7. S/2, d/3. (2×6m/12), 67%	3	3	4	3	7	3	8	9
8. 2S/2, d/3, 133%	8	11	12	14	6	6	12	17
9. 2S/2, d/3, 6m/12, 67%	4	6	3	3	1	3	7	6
10. 2S/2, d/3, 12m/18, 89%	4	5	5	5	3	2	6	12
11. 2S/2, d/3, 8m/12, 89%	3	5	7	7	3	2	4	11
	36	56	65	71	60	41	82	139

TABLE V

Census of Diseased and Damaged Trees

Tapping Systems	No. of Trees in tapping		No. of Trees out of Tapping									
	Brown Bast	As a % of Total	Brown Bast	As a % of Total	Dry Bark	As a % of Total	Thin Bark	As a % of Total	Total out of tapping	As % of Total in Tapping	No. of trees wind damaged*	As % of Total
1 S/2, d/2, (2×6m/12), 100%	10	5·6	4	2·2	15	8·3	7	3·9	26	14·4	15	8·3
2. S/2, d/2,(2×6m/12), 12m/18, 67%	5	2·8	2	1·1	5	2·8	0	—	7	3·9	10	5·6
3. S/2, d/2, (2×2d/4), 100%	9	5·0	6	3·3	16	8·9	3	1·7	25	13·9	16	8·9
4. S/4//S/4, d/2,(2×6m/12) 100%	12	6·7	10	5·6	18	10·0	5	2·8	33	18·3	20	11·1
5. 2S/2, d/4, 100%	10	5·6	10	5·6	12	6·7	7	3·9	29	16·1	12	6·7
6. 2S/2, d/4, 12m/18, 67%	4	2·2	2	1·1	2	1·1	2	1·1	6	3·3	10	5·6
7. S/2, d/3, (2×6m/12),67%	5	2·8	4	2·2	6	3·3	1	0·6	11	6·1	12	6·7
8. 2S/2, d/3, 133%	10	5·6	7	3·9	22	12·2	10	5·6	39	21·7	9	5·0
9. 2S/2, d/3, 6m/12, 67%	5	2·8	1	0·6	4	2·2	1	0·6	6	3·3	8	4·4
10. 2S/2, d/3, 12m/18, 89%	8	4·4	4	2·2	10	5·6	2	1·1	16	8·9	4	2·2
11. 2S/2, d/3, 8m/12, 89%	6	3·3	5	2·8	5	2·8	1	0·6	11	6·1	15	8 3

* Yields have been adjusted for trees eliminated by wind damage

STAND PER ACRE OF BUDDED TREES IN COMMERCIAL TAPPING

C. C. T. SHARP, *Botanist*

OPINIONS on the number of trees that should be planted to the acre and the number that should be brought into tapping show much diversity. Initial stands of as few as 109 trees to the acre are still recommended and at the opposite extreme as many as 180 to the acre have been planted with the intention of retaining that number for the first three or four years of tapping. Since much replanting is likely to take place in the near future the time seems opportune to review the available experimental evidence on the subject.

The interim results of two experiments have been reported :—

(1) A Density of Planting Experiment set up by the A.V.R.O.S. in Sumatra (Schmole 1940).

(2) A Density of Planting Experiment on the R. R. S. Experiment Station in Malaya (R. R. I. M. 1939).

The A.V.R.O.S. Experiment.—This experiment was planted in October-November 1927 with budded stumps of ten of the older AVROS clones. Five densities of planting were compared giving 450, 253, 162, 112 and 83 trees to the acre. Square planting was adopted at each density. The field was divided into 40 plots of .6 acres, eight plots being allotted to each treatment. Tapping was commenced in April 1933, five and a half years after planting, and all trees with a girth of not less than 18 inches (45 cm.) were brought into tapping. In the two most densely planted treatments very backward trees which were not in tapping were thinned out at the age of 9 years. Otherwise no thinning out was undertaken.

In the R. R. I. M. Experiment—six densities were compared with stands of 435, 302, 222, 125, 109 and 48 trees per acre. In the plots with 125 trees per acre 20 ft. triangular planting was adopted and square planting in the remaining plots. Storm-damaged and diseased trees were removed as they occurred but apart from this no thinning out was undertaken. The experiment was planted with budded stumps of AVROS 50 in December 1930 and tapping commenced in January 1937 when the trees were six years old and all trees with a girth of not less than 20 inches at 40 inches from the union were brought into tapping.

The field was divided into 36 plots of 1.1 acres each, six plots being planted at each density.

Up to the sixth year girth measurements of all trees were taken. In the seventh year boundary belts were marked off from each plot and girth and yield records were taken from the reduced plots of 0.65 acre from the seventh year onwards. This accounts for the apparent reduction in the girth of the more densely planted plots in the seventh year.

The two experiments were carried out on very similar lines, the principal differences apart from those associated with soil, climate, etc. being the clones used and the minimum girth required before the trees were brought into tapping.

Yields

The yields in pounds per acre are given in Table I and the number of trees tapped in Table II.

In the AVROS Experiment—the yields of the 450 plots remain roughly the same as those of the 253 plots and there is clearly no object in planting at so high a density as 450 to the acre. At the opposite extreme the plots with 83 trees to the acre gave consistently lower yields than those with 112 trees and interest centres round the three remaining densities of 253, 162 and 112 trees per acre.

In the 112 plots the stand of tappable trees per acre rose from 94 in the first tapping year to 104 in the third after which it did not increase and in the 162 plots the number of trees tapped increased from 124 in the first year to 148 in the third year and thereafter remained constant at about 150. During the same period the yields of the 162 plots exceeded those of the 112 plots by 56, 110 and 127 lbs. per acre, and continued to show a steady increase in excess yield up to 171 lbs. in the sixth tapping year. Very much better results were obtained from a stand of 162 trees to the acre with 150 tappable trees than from a stand of 112 trees.

The differences in yield between the 253 and 162 plots are much smaller, being 52, 58, 22, 39, 45, 56 and 84 lbs. per acre in each tapping year. In the 253 plots the stand of tappable trees was 163 to the acre in the first tapping year and then rose to 196 in the third year, after which it remained constant at about 200. Early in the fifth tapping year all trees too small to tap were thinned out. During the first four years of tapping the 253 plots yielded on the average 34 lb. per acre more than the 162 plots but this extra yield was obtained at the cost of tapping 32 per cent more trees. At first it may appear that the extra yield was not worth obtaining at an increase of 30 per cent in the tapping costs but after the small trees were thinned out the excess yield increased steadily to 84 lbs. per acre in the seventh tapping year and it is probable that if the thinning out had taken place in the fifth instead of the ninth year much better results would have been obtained. It may be concluded from the AVROS Experiment that the optimum stand of tappable trees will lie at 150-200 trees to the acre and probably nearer to the former figure.

In the R. R. I. Experiment—the trees were not brought into tapping until they had reached a girth of 20 inches at 40 inches from the union. Moreover the rate of growth was very much slower than in the AVROS Experiment. This can be attributed partly to the poor soil in which the experiment was set up and partly to the comparatively slow growth of AVROS 50 which is of less than average vigour. These differences make comparison with the Avros experiment more complicated.

From Table I it will be seen that the yield increased steadily with an increase in stand up to 222 trees to the acre and that at higher densities it declined. The yields of the 302 and 435 plots were however steadily catching up the 222 plots as a larger proportion of trees reached tappable size.

The yield records only extend over three years but it seems unlikely that the plots with 435 trees to the acre will in the long run prove better than those with 302. Similarly 48 trees is evidently far too low. Interest therefore centres round the plots with 109, 222 and 302 trees to the acre.

Compared with the 109 plots the excess yields of the 222 plots were 75, 106 and 169 lbs. per acre during the first three years of tapping. In this case 222 trees to the acre does not appear to be any too high a stand to retain for at least three years, for the yield rises steadily compared with the 109 plots as a larger proportion of the trees become tappable.

The yields of the 302 plots are steadily catching up those of the 222 plots but it can safely be inferred that 302 trees to the acre is too high a stand to retain for as long as the third year of tapping.

The proportion of tappable trees to the acre is much lower than in the Avros Experiment. In the 222 plots there were only 160 in the third tapping year and in the 302 plots 187. Since the yield of the 222 plots is still rising rapidly compared with the 109 plots it may be inferred that the optimum stand of tappable trees by the third year is probably higher than 160.

Combining the results of the two experiments it would seem that *regarded solely from the point of view of the early yields* the optimum stand of tappable trees by the third tapping year would lie between 150 and 200 and that under the conditions of the R. R. I. Experiment a higher stand will be desirable than under Avros conditions. This last point suggests that a smaller stand of trees will be possible when very vigorous clones are used or when the conditions for growth are above the average.

On the other hand the presence of a larger number of untapped trees in the three closest plantings of the Malayan experiment and of the 253 plots of the Avros Experiment must have had an adverse effect on the yield and growth of the tapped trees. If the stand had been reduced at the time the experiments were brought into tapping by removing all the trees which were so small that they would not have reached tappable size within three years it is probable that better results would have been obtained in which case a rather higher optimum stand than that suggested above would be indicated.

Considerations other than Yields.

There are however other things to be considered besides yield, notably :—

1. The rate of growth, particularly so far as it affects the time that must elapse before a field is tappable.
2. Bark thickness, the rate of renewal and the quality of the renewed bark.
3. The effect of a high density on the rate at which the tapping panels dry after rain.
4. The effect of stand per acre on panel diseases and Brown Bast.
5. Tapping costs.

Rate of Growth.—Table III. In the R. R. I. Experiment there was no evidence of any reduction in the rate of growth up to the end of the third year by which time the mean girth was a little over 8 inches. In the fourth year the three highest densities were showing the effects of competition and from the fifth year onwards the effect became steadily more marked at all densities. By the third tapping year the rate of growth of the 222 plots was ·6 inch per annum, or half that of the 109 plots. In the Avros experiment the plots with 450 trees to the acre showed a slight drop in rate of growth by the end of the third year by which time the mean girth was 13.8 inches, but the plots with lower densities showed no effects of competition although they were considerably larger than the trees in the R. R. I. Experiment at the same age. Here again the matter is complicated by the use of ten clones which were planted in different proportions.

The slowing down of the early growth of the trees with increased stand per acre does not delay the time at which the plots would become tappable. If 70 trees per acre of tappable size is the minimum number required before a field is considered tappable, and this was the usual standard in Malaya, it will be seen from Table II that the R. R. I. Experiment was brought into tapping when the 109 plots had just reached tappable size. On the other hand the 222 plots had 113 tappable trees per acre by that time and would have had the necessary minimum number

of 70 trees about 6 months earlier. In spite of the lower mean girth of the densely planted plots they would be tappable sooner. The Avros figures corroborate the results of the R. R. I. Experiment.

It may be concluded that growth is much retarded by increasing the stand per acre but, in spite of this, densely planted fields could be brought into tapping earlier than widely planted ones.

Bark Thickness and Bark Renewal.—The thickness of the virgin and renewed bark in the two experiments is given in Table IV.

In the Malayan Experiment the principal effect on the bark of increasing the density of planting was to reduce the thickness of the virgin bark. The renewed bark measured as a percentage of the thickness of the virgin bark is about constant at all densities. With a stand of 222 trees to the acre the mean thickness of the three year old renewed bark is 6.08 mm. which should be sufficient to provide adequate renewed bark at the end of 8 years, the normal tapping cycle in Malaya. The general condition of the renewed bark was satisfactory.

In the Avros Experiment the virgin bark is thicker than in the Malayan Experiment as would be expected from the generally better growth. This also applies though to a smaller extent to the thickness of the three year old renewed bark. Expressed as a percentage of the virgin bark the thickness of the renewed bark at all densities is considerably lower than in the R. R. I. Experiment but again shows no difference at the different densities.

In reporting this experiment Schmole stated that serious burring, ridging and other irregularities occurred on the renewing bark of the more densely planted plots and that in the two most densely planted ones the renewed bark of many of the trees would be insufficiently thick to tap after eight years and that such densities without further selective thinning should not be considered. He added that the same would hold though to a lesser degree in the unthinned 162 plots. It will however be noted that at the end of the third year the thickness of the renewed bark in the 162 plots was equal to 94 per cent of that of the 112 plots and that it declined to 84 per cent in the seventh year. It seems reasonable to conclude that if the 162 plots had been thinned out at the end of the third year the slowing down in the rate of renewal would have been arrested.

In both experiments the measurements of bark renewal were taken on the trees which were brought into tapping when tapping first commenced. These were of necessity the best grown trees in the plots and the average thickness of the renewed bark of all the trees would be less than that shown in the table. The exaggeration of the thickness of the renewed bark would be greatest in the most densely planted plots which had the smallest proportion of tappable trees.

It is on this question of bark renewal that the two experiments differ most widely, the results in Sumatra being much less satisfactory than in Malaya. It is probable that this difference is chiefly due to the greater vigour of growth at all densities in the Avros Experiment which would intensify the competition between the trees in the different plots. It is possible that the differences in vigour of the ten clones used may also have contributed to the poor renewal since in competition with their stronger neighbours the weaker growing clones would be subjected to less favourable conditions than would occur in a monoclone planting.

Taking the results of the two experiments together it seems clear that the estimate of the optimum stand based on yield alone is too high. Under the conditions of the Avros Experiment about 160 trees to the acre at

the end of the third tapping year when they had a mean girth of 26 inches would be the maximum and this stand would have to be reduced later if adequate bark renewal is to be obtained. It is also clear that the optimum stand will vary greatly with the size of the trees and that under favourable conditions of growth or with vigorous clones a lower stand would be possible than in less favourable conditions with weaker growing clones.

In the R. R. I. Experiment the clone used, Avros 50, was much below the average in vigour and the soil was below the average fertility. It is thought that the conditions prevailing in the wet districts of Ceylon are nearer to those in the Avros Experiment than in the Malayan Experiment, but the optimum stand of trees must be expected to vary slightly with the conditions.

The Rate of Drying of the Tapping Panels.—It is commonly found that during the first few years of tapping of a field of budded rubber a larger number of tapping days are lost than is the case with old seedling rubber owing to the longer time required for the tapping panels to dry. It has been contended that a high stand of trees per acre will increase the number of late tappings and days on which no tapping can take place and will result in a loss of crop.

The answer to a recent questionnaire sent to estates with budded Rubber in tapping in 1944 an exceptionally wet year, does not support this contention.

Altogether the yields from 24 fields of Tj. 1 which were tapped for the first complete year in 1944 were available and the details of these fields are given in Table V. As would be expected there is much variation in the yields and number of trees and tappings in the different fields owing to the wide variety of conditions in which they were grown but there is none the less a steady increase in the yield with an increased stand per acre. The correlation between total stand per acre (not tapped stand) and yield in the first complete tapping year is +.43 and the increase in yield per acre within the range of 108-166 trees to the acre averages 44 lbs. for every increase in stand of ten trees. It is clear from this that any loss in tapping days that may have occurred as a result of a denser stand is more than offset by the higher yield per tapping. It should also be noted that within these limits there is no correlation between stand per acre and number of tappings.

Tapping Panel Diseases.—It is probable that if no preventive measures were taken the risk of bark rot would be much increased with a higher stand owing to the longer period required for the trees to dry after rain. It has been found however that so long as the proper preventive measures are adopted bark rot can be controlled satisfactorily. In the wet districts preventive measures are a matter of estate routine and the extra cost involved would be roughly proportional to the increased number of trees per acre.

In young clearings the most vigorously growing trees are more liable to get Brown Bast than the less quickly growing ones. An example of this can be found in a small field of Gl.1 on Dartonfield in which 41 out of 256 trees were affected with B.B. during the first three years of tapping. In the following table the trees have been classified according to their girth when tapping commenced and the percentage of trees in each group affected with B.B. during the first three years of tapping is shewn.

Girth inches	Total trees	B.B.	Per cent
17 –	56	3	5.4
19 –	96	12	12.5
21 –	61	13	21.3
23 –	36	11	30.5
25 –	7	2	28.6
Total	256	41	16.0

It is clear that the larger more rapidly growing trees are more liable to Brown Bast than the smaller slower growing ones, for the 40 per cent largest trees have 60 per cent of the cases of Brown Bast. A high stand of trees, by reducing the rate of growth would be expected to reduce the incidence of Brown Bast.

It has been observed that the first serious outbreak of Brown Bast usually occurs in the third or fourth tapping year. If a high stand is retained until then it will be possible to cut out the worst cases of Brown Bast without reducing the stand below the economic level.

Tapping Costs.—In the Avros Experiment the tapping costs were given for 1939, the seventh tapping year.

Stand per acre ...	450	253	162	112	83
Trees tapped per acre ...	287	198	150	102	77
Costs cents (guilder) per lb.	2.2	1.6	1.4	1.1	1.0
Costs per cent ...	200	145	127	100	91

In this case larger tasks were given at high densities to compensate for the smaller trees and shorter distance between the trees. It may be estimated from this that with a stand of 175 tappable trees to the acre the cost of tapping will be between 30 and 40 per cent, or half a guilder cent per lb. higher than it would be with a stand of 112.

It was not possible to vary the task size with the stand per acre in the R. R. I. Experiment and in estimating the cost of tapping it has been assumed that the same number of trees would be tapped at all densities. The comparative costs in the third tapping year were :—

Stand per acre ...	435	302	222	125	109	48
Trees tapped ...	209	187	160	104	86	47
Comparative cost ...	212	176	147	119	100	71

In this case the cost of tapping in the 22 plots with 160 tappable trees to the acre is increased by 47 per cent. Since no allowance is made for the smaller size of the trees and the larger task that could be tapped this figure is exaggerated and in practice it would probably be found not to differ much from the Avros figure. Under normal conditions tapping costs amount to only a small part of the cost of producing rubber and the increased costs involved would not be prohibitive if there were 150-160 trees tapping.

Discussion

In deciding the optimum stand per acre there are three points to consider :—

1. How many trees to plant.
2. How many to retain up to the time the trees are tappable and how many to thin out before the field is brought into tapping.
3. What further thinning out, if any, is necessary after the field is brought into tapping.

In the experiments described no provision was made for systematic thinning out, though in the Avros Experiment all trees too small to tap in the 253 and 450 plots were thinned out in the ninth year.

In considering the two experiments it was concluded that the highest yield would be obtained from a stand of 150-200 tappable trees per acre by the third year of tapping. In discussing the other considerations the only one that would compel any modification of that figure was that of bark renewal. In the Malayan Experiment with 222 trees to the acre and 160 in tapping in the third year there was no indication that the stand was too high to obtain satisfactory renewal, but in the Avros Experiment it was equally clear that a stand of 160 trees was likely to be the maximum and that this would have to be reduced after the third year of tapping. It is also likely that under exceptionally favourable conditions or with very vigorous clones it might be necessary to retain rather fewer than 160 trees though this is unlikely to occur very frequently in Ceylon. Again it is possible that under less favourable conditions a higher stand than 160 could be retained for the first three years of tapping but this could not be done without risk and in the present state of our knowledge it would be inadvisable to do so. This gives an approximate answer to the second question that at the time the field is brought into tapping the stand should be about 160 trees. Allowance must be made however for thinning out badly grown, mis-shapen trees before the field is tapped. A planting density of about 170-180 is therefore recommended for budded stumps in place of the 140-150 which has hitherto been the standard recommendation of the R. R. S. or about 200 if budding is to take place in the field. This gives an approximate answer to the first question.

The evidence of the two tapping experiments goes to show that reducing the stand below 160 trees before the third year of tapping is unnecessary except when the growth has been very rapid. It is clear however from the Avros Experiment that 160 trees to the acre is likely in many cases to be too high a stand after the third tapping year. There is, however, no evidence from the experiments to show by how much it should then be reduced nor how much further thinning out will be necessary as the trees increase in size. All that can be said with any certainty is that in the past thinning out has often been too heavy and that stands of 70-80 trees to the acre are too low. It is suggested therefore as a possible answer to the third question that until there is more evidence available stands should be reduced to 120-130 trees after the third tapping year and thereafter reduced progressively to about 90-100 by the time the trees are 20 years old. These figures might prove too high in the case of exceptionally vigorous clones or where growth is much above the average and may be too low for less vigorous clones in poor conditions.

The evidence on which these conclusions are based is not extensive and has been obtained from experiments carried out in other countries. The conclusions should therefore be regarded as tentative and it is likely that the recommendations derived from them may have to be modified with greater experience of higher stands under commercial conditions.

References

1. Rubber Research Institute of Malaya—Annual Report 1939 p. 97.
2. Schmole J. F. Voorloopige Resultaten van een Plantverband proef met Oculaties. Archief voor de Rubbercultuur 24, 1940.

TABLE I

Yield in lb. per acre

Avros Experiment

Planting distance metres	Stand per acre	Mean Age in each tapping year													
		5½		6½		7½		8½		9½		10½		11½	
		Yield	%	Yield	%	Yield	%	Yield	%	Yield	%	Yield	%	Yield	%
3×3	450	410	132	717	141	835	126	1077	118	1188	121	1207	127	1224	120
4×4	253	418	135	665	131	811	123	1079	118	1191	122	1176	124	1236	121
5×5	162	366	118	617	122	789	119	1040	114	1144	117	1120	118	1152	113
6×6	112	310	100	507	100	662	100	914	100	979	100	949	100	1021	100
7×7	83	261	84	485	96	607	92	840	92	932	95	909	96	938	92

Tapping System S/2, d/1, m/2, 100%

R. R. I. Experiment

Planting distance feet	Stand per acre	Mean Age in each tapping year					
		6½		7½		8½	
		Yield	%	Yield	%	Yield	%
10×10	435	263	76	464	101	742	115
12×12	302	385	111	539	118	800	124
14×14	222	421	122	564	123	816	126
20 Δ	125	345	100	511	112	655	101
20×20	109	346	100	458	100	647	100
30×30	48	261	76	324	71	497	77

Tapping System S/2, d/2, 100%

TABLE II

Number of Tappable Trees per Acre at the beginning of each Tapping Year

Avros Experiment

Stand per acre	Age in years							
	5¼	6¼	7¼	8¼	9¼	10¼	11¼	12¼
450	191	257	273	285	289	288	288	287
253	163	189	196	201	202	200	200	198
162	124	144	148	150	149	151	154	150
112	94	102	104	103	104	103	104	102
83	71	77	78	77	77	76	78	77

Trees were brought into tapping when they had reached a girth of 28 inches (45 cm.) at a height of 40 inches.

In the ninth year trees in the 450 and 253 plots which had not reached tappable size were cut out.

R. R. I. Experiment

Stand per acre	Age in years		
	6	7	8
438	87	148	209
302	118	160	187
222	113	144	160
125	76	95	104
109	70	81	86
48	36	44	47

Trees were brought into tapping when they had reached a girth of 20 inches at 40 inches from the union.

TABLE III
Girth in Inches
Avros Experiment

Stand per acre	Age in years										
	2¼	3¼	4¼	5¼	6¼	7¼	8¼	9¼	10¼	11¼	12¼
450	8·2	13·4	16·1	18·1	—	20·4	21·5	23·0	23·8	24·4	25·0
253	7·7	14·0	18·1	20·9	—	23·4	24·6	25·1	25·9	26·6	27·4
162	7 7	13·8	18·6	22·4	—	25·4	26·6	26·5	27·4	28·1	29·0
112	7·8	14·0	19·2	24·0	—	27·3	28·8	28·8	29·9	31·0	31·9
83	7·7	14·0	19·3	24·0	—	28·2	30·0	30·5	32·1	33·2	34·2

R. R. I. Experiment

Stand per acre	Age in years							
	2	3	4	5	6	7	8	9
435	5·2	8·1	11·1	13·2	14·7	14·1	15·4	15·9
302	5·1	8·2	11·7	14·2	15·9	15·6	17·0	17·5
222	4·9	7·8	11·5	14·8	17·1	17·3	18·8	19·4
125	5·1	8·2	12·1	15·5	18·1	18·8	20·8	22·0
109	5·1	8·3	12·1	16·3	18·7	19·1	21·0	22·2
48	4·8	8·0	12·1	16·4	19·3	21·5	25·5	28·0

TABLE IV

Bark Measurements

Avros Experiment

Stand per acre	Virgin bark ($8\frac{1}{4}$ years) mm.	Mean Bark Thickness. (mm.) Renewed Bark						
		1 year old		2 years old		3 years old		7 years old
		Mean	% of V. B.	Mean	% of V. B.	Mean	% of V. B.	mm.
450	7·6	5·0	65·8	5·5	72·4	5·8	76·3	5·1
253	8·3	5·1	61·4	5·7	68·7	5·9	71·1	5·7
162	8·7	5·3	60·9	5·9	67·8	6·1	70·1	6·2
112	9·1	5·5	60·4	6·3	69·2	6·5	71·4	7·4
83	9·6	5·9	61·5	6·6	68·7	7·1	73·9	7·7

Measurements of the Thickness of Virgin and Renewed Bark

R. R. I. Experiment

Stand per acre	Virgin bark (9 years) mm	Mean Bark Thickness. (mm.) Renewed Bark					
		1 year old		2 years old		3 years old	
		mm.	% of V. B.	mm.	% of V. B.	mm.	% of V. B.
435	6·10	4·37	71·6	5·24	85·9	5·74	94·1
302	6·47	4·53	71·6	5·22	80·7	5·67	87·6
222	6·66	4·73	71·0	5·54	83·2	6·08	91·3
125	7·78	5·47	70·3	6·37	81·9	7·02	90·2
109	8·04	5·74	71·4	6·66	82·8	7·31	90·9
48	9·02	6·36	70·5	7·34	81·4	8·10	89·8
Standard Error	·115	·121	—	·138	—	·131	—

TABLE V

Yields of fields of TJ. I in the first year of tapping on estates in wet low-country districts

Estate Number	Acres	No. of tappings	Stand per acre		Yield lb. per acre	Estate Number	Acres	No. of tappings	Stand per acre		Yield lb. per acre
			Total	Tapped					Total	Tapped	
139	12	132	115	84	537	138	50	130	139	100	277
141	10	162	133	124	642	26	29	146	132	111	445
140	50	113	141	123	475	350	10	147	117	106	582
152	15	128	129	94	467	128	18	162	146	128	825
476	22	135	132	112	346	,,	25	163	166	140	641
613	15	138	138	125	610	172	22	140	119	90	254
595	113	137	105	97	249	153	10	140	108	101	440
125	17	121	123	103	563	,,	21	159	128	115	583
01	5	134	127	124	667	477	12	135	123	104	475
284	29	142	131	84	224	,,	104	150	138	94	357
,,	15	145	138	77	276	,,	22	147	112	71	276
238	5	144	135	123	647	546	13	114	129	98	611

SELECTED NATURAL COVERS IN YOUNG BUDDED RUBBER *

G. HUNTLEY—VINCIT ESTATE

ALMOST exactly 8 years ago, in June 1938, I initiated an experiment to determine the growth and advantages with, and later, under, T.J.1 budded rubber, of introduced forest. An introductory account of the experiment appeared in this journal in December 1941.

The estate on which the experiment took place borders the intermediate dry zone, rainfall 148.72 ins. over 15 years, and the venue of the experiment was the sun-baked, fissured and eroded laterite summit slope, 764 ft.—500 ft., of land under 30 year old rubber.

Very briefly, 5 acres out of 46 acres, its poorest and steepest section, was set aside, and, in place of the ordinary adjuncts to replanted rubber, *Vigna, Desmodium Ovalifolium, Crotolaria Usaramoensis, Tephrosia Vogelii* and *Gliricidia* occupying the 25 ft. between its contours a specially chosen natural cover, "A" variety, was sown by seed cutting and tuber, as follows: 4 creepers; 26 herbs; 9 shrubs; 33 trees.

The budded stumps were 12 ft. apart or an actual stand, in these 5 acres, of 123 trees per acre. The stand, throughout the 46 acres, is 139.

All plantings, accepted and forest, were coincident with the transplanting from nursery of 18 months old budded stumps.

All logs were contour stacked.

During the 8 years under review agricultural procedure has been as follows:—

41 acres.—Manure and application as per R. R. S. recommendations throughout; deep forking expanding with growth to eventuate in alternate contour bands; uprights, and, latterly, creeping cover, pruned and green material incorporated in the furrows. Gliricidia removed in the 5th year. Annual clearing of drains and silt-pits.

5 acres.—The exact amount and application of manure as for 41 acres.

Forking was only undertaken in the 12 ft. inter-tree contour, in 1941 (twice), 1944 and 1945. No drains or silt-pits were cleared. All jungle cover was pruned twice per annum, up to the end of 1943, where declining growths required but a single lop, and strawn without trampling along the rubber contours.

In December 1941, when the article, with Mr. C. A. de Silva's admirable plates, was published, the induced forest, at 3½ years, was mature, vigorous and thick. "A continuous wall of jungle" between the rubber contours — "all of "A" class species, 18 ft. broad and from 6 ft. to 13 ft. high on either side, through which the young tree bowls are invisible."

Girth measures, 6 trees in each contour commencing at the 4th tree *inside* the jungle cover, compared with similar measurements in the

* The Rubber Research Board welcomes papers on subjects of general interest from outside contributors, but does not accept any responsibility for the views expressed therein.

control areas adjacent, (average of the *two* boundaries, as the 5 acres lies *within* 41 acres), showed but ⅛-inch. increase in favour of control.

Costs, over the 4 years from felling, favoured Natural Cover by as much as Rs. 45-78 per acre.

Finally, these 3½ years proved that forest culture needed annual and individual attention as opposed to the routine of "Green Manure" and a far closer scrutiny of that vital early growth of the main product by reason of its concealment within green walls.

4½ years ago I wrote "Looking up the hillside of this 5 acres today, with the rich natural cover just pruned, for the 5th time, the entire slope presents a fresh unbroken green, the strawn layers hidden except in the very steepest parts."

And now — 9 full months from the last pruning — every lower tree-bowl is visible from end to end of the plot, and the straggle of diminishing, dying growth is much that of a gravelly overworked "Lapala" Chena 2 months from its final and exhausting crop of "Amu." In place of the forest walls, through which, in the past a way was forced, one strides the entire length with hardly an interruption, 2/3rd of the soil visible, above rather than through pale hip-high wisps of growth. Where the overhead shade is thick there is hardly a shrub or tree, only when cart road or rock opens the canopy does the growth momentarily quicken.

Rather than state the disappearance or persistence of any particular species it would be more correct to note that *all* have succumbed to the permanent rubber, the only healthy remainders being the tubers of wild ginger and "harankaha," (turmeric), whole the course "Keng Henda" sparely colonises lighter areas. Elsewhere individual specimens sprout at intervals amid the half-open abandoned umbrella-like growth of the pruned-tree varieties.

Creepers have almost entirely disappeared and, had the estate been weedy, grass would undoubtedly have intervened. The process has, of course, been gradual.

When 3½ years old Sun flower; "Pinna ;" "Kenelha ;" "Gedumba" would, if not curtailed have smothered all other growth, while "Pynayru" and Castor oil showed signs of usurpation.

This ranker growth had its effect upon the rubber, for the 3½ year deficit of ⅛-inch increased girth had risen, at July 1943, 1 2/3rds years later, with rubber at 5 years, to 13/16 ins.

In the next 2 years, however, as the jungle growth declined the rubber regained part of this deficit and, at November 4th, 1944, age 6½ years, the difference in favour of control was reduced to ⅛-in. increase over the entire period.

The victory, therefore, has been bloodless as well as complete. *Rubber has won.*

It must not, however, be thought that this graveyard lies in the midst of verdant and legitimate creeping cover. There the same tale is told, bare soil and dwindling creepers, all 4 mixed varieties, throughout the 41 acres. In fact, and probably due to less forking, the 5 acres provides a better film of soil texture, though both are flimsy.

Costs also, marching closely with the rise and decline of forest, have, finally, been equalised, viz: eliminating items common to both.

	Summary — per acre	
	Jungle Cover	Platform cum Trench
...	Rs. cts.	Rs. cts
1938-1941	71.64	117.42
1942-1944	55.44	36.12
1945	10.03	4.44
Add	137.11	
Uprooting Jungle Cover	12.00	
Planting creeping covers	2.40	
Cleaning drains and silt-pit	7.20	
	158.71	157.98

A more than interesting experiment, where *real* and *controlled* forestry, as distinct from the so-called forestry of *un*controlled growth of existing species cum grass, has, in the instance and conditions of this particular essay, shown no superiority over general and infinitely simpler cultural methods.

EDITOR'S NOTE

Mr. Huntley observes that after 6½ years the average girth of the trees in the experimental "forestry" block is ⅜-in. less than in other parts of the clearing. It is important to note however that the block chosen for the trial was originally the "poorest and steepest section" of the clearing. It is no disparagement of Mr. Huntley's industry and enterprise to remind readers that the quantitative results of unreplicated field trials are always liable to be inconclusive. Nevertheless Mr. Huntley's article forms a useful contribution to the literature of the subject, particularly in relation to the density and character of the indigenous flora at different stages of the trial.

We publish in the article that follows a preliminary account of our own observations in two clearings at Nivitigalakele where *unselected* indigenous covers were allowed to establish themselves after the felling of high forest.

OBSERVATIONS ON A "NO BURN" CLEARING AT NIVITIGALAKELE

L. A. WHELAN AND C. A DE SILVA

THIS is a ten acre block on a very steep hillside previously in medium forest which was opened and planted in 1941 with hand pollinated seedlings and with budded trees of clones derived from these seedlings.

Girth measurements for this clearing and for a similar neighbouring clearing of budded stumps opened and planted in 1940 are given in this paper. For the purpose of comparison, measurements from a neighbouring block of budded stumps planted in 1939 after a medium burn of jungle are included.

Details of the method of opening the 1940 clearing were given on page 72 of the second *Quarterly Circular* for 1940. Manuring has been carried out on the three blocks according to R. R. S. recommendations, Saphos for well grown trees and R215 mixture for backward trees.

1941 "No Burn" Clearing.

Average Girth in Inches at 3 feet.

		1942	1943	1944	1945	1946
Mean of 187 Seedlings	Girth	3.8	6.0	8.8	11.8	16.1
	Annual increment		2.2	2.8	3.0	4.3
Mean of 573 Buddings	Girth	3.0	5.2	8.5	11.1	15.5
	Annual increment		2.2	3.3	2.6	4.4

An average girth of 15½-16 inches is not exceptional for five year old trees, but it is likely that better growth could have been attained by closer attention to slashing of the undergrowth.

Comparison of Growth in Three Clearings
Annual Girth Increments in Inches of Budded Stumps

Clearing	Years since planting 1	2	3	4	5	6	7
1939 Medium Burn	2·1	1·6	2·5	4·0	3·2	2·2	3·3
1944 No Burn	2·7	2·8	2·0	3·3	2·8	3·8	
1941 No Burn	3·0	2·2	3·3	2·5	4·4		
	1941-42	42-43	43-44	44-45	45-46		

(Figures within diagonal rows give increments over the period stated at the foot)

From a comparison of the figures in the vertical columns it is seen that in the first two years after planting growth was better on the no burn areas than on the fired area. In the third and fourth years it had dropped behind but in the fifth and sixth it had again taken the lead.

Climatic differences between years may detract somewhat from the value of the comparisons made above, but if the comparisons are made for the same calendar period similar results are obtained. In the twelve months 1940-41 the one year old trees of the 1940 clearing had made better growth than the two year old trees of the 1939 clearing. For the following year 1941-42 the one and two year old trees of the "no burn" clearings had made better growth than the older trees of the 1939 area. In 1942-43 there was a marked setback to the "no burn" trees, this evened up in the following year, and in the period 1944-46 the "no burn" trees again showed the better growth.

Owing to shortage of labour during the war, the control of undergrowth by slashing and pruning was not up to the desired standard. This may largely account for the comparatively poor growth over the period 1942-45. Another factor which is now important in the control of undergrowth is the closing in of the canopy of Rubber foliage. Bamboo which was common up till 1945 is now being crowded out by Mikania, a development which will allow of greater uptake by the young Rubber of plant food conserved by this method of opening.

In the early stages of the work the saving in time secured by the "no burn" system when compared with more orthodox methods is of considerable importance particularly when the decision to replant is made at short notice. The period of waiting for weather conditions suitable for a burn is avoided and if labour is available so that holing and planting follow closely on felling and clearing of rentices a saving of several months may be made.

Damage by vermin has been negligible and only a few cases of diseased trees have been noted.

The neighbouring medium burn and no burn clearings afford a comparison of the extent of erosion on this steep hillside. In the fired area evidence of considerable soil wash was provided by the trapping of fine soil in the drains during the early years despite the establishment of a leguminous cover. In the "no burn" areas very little soil was carried into the trenches between the trees, and filling of these had to be carried out by hand.

A fuller report on the "no burn" areas will be published later giving further growth records and details of costs.

CONCLUSION

Rubber planted in 1941 on land opened by the "no burn" method is now showing excellent growth. Losses from root disease and animal pests have been negligible, and despite the steepness of the land there has been practically no loss of surface soil. Growth records demonstrate the importance of slashing back undergrowth during the early years until such time as the ground cover is effectively controlled by shade from the Rubber trees.

REVIEWS

Chemicals Humus and the Soil.—By Donald P. Hopkins (Faber and Faber 12/6). This is a well written book by a Chemist who left agricultural research to enter agricultural industry. It is presented in non-technical language and although the author deals almost entirely with temperate crops there is within its 270 pages much food for thought for all those who are interested in soil fertility.

The main theme is that there is no clash between natural manures and chemical fertilisers and in developing this the author pays attention to some common misunderstandings. Tribute is paid to the "Humus School" in drawing attention to the importance of humus but the author criticises in considerable detail their contention that fertilisers merely stimulate crops and eventually poison the soil with resultant serious harm to plant and animal life.

The case for the use of fertilisers is presented in the first part of the book and the arguments against their use are examined in the second part. The author's aim is to present the reasoning behind both sides of the case and to give the farmer something more than rule of thumb recipes and practical "dope." In the reviewer's opinion he has gone a long way towards achieving this.

One chapter is devoted to losses and gains of soil nitrogen and the author stresses the need for a policy that combines addition of nitrogenous fertilisers with sound conservation practices. In the chapter headed "The Humus Monopoly" he deals with the formation and the importance of humus and considers at some length the question whether the NPK deficiencies of the soil could be met entirely by exploitation of the likely sources of humus. The chapter dealing with "Plant Disease" is of general interest but a reference is made to the disease that swept away Ceylon's coffee plantations. The author mentions that Marshall-Ward in his diagnosis did not include any connection of the disease epidemics with nutrition — either NPK or humus. He points out that research workers on plant diseases are not spending much time on the idea that fertilisers and disease are connected, but they are working — and progressing — along the lines first of preventive and remedial control by chemical means — such as spraying — and second by the development of immune varieties. (Incidentally these are the lines that are being investigated by the R. R. S. with respect to Oidium disease).

Other subjects dealt with at varying length are the terminology of the NPK trio and their functions in the plant, the value of modern field experiments and laboratory analysis, the misuse of fertilisers, the "trace elements" in plant nutrition, the various types of fertilisers and food values in relation to fertilisers (dealing with human health).

Reference is made to "vested interests" in connection with the use of fertilisers and the author quotes Marshal Stalin in 1934 scolding his agriculturists for not using fertilisers produced by the State agricultural industry and concludes "when vested interests are abolished it would seem that the fertiliser idea still remains."

A simple explanation is given of soil acidity and the symbol "pH" in appendix II and a useful bibliography (with author's comments) in appendix III.

The subject matter is well set out and the book is clearly printed.—L. A. W.

Report on Post-War Preparation and Packing of Rubber (Imperial Institute, London). When natural rubber had no competitors growers seldom gave much thought to the problem of improving their product. Manufacturers accepted without serious complaint the grades of rubber which they were offered and producers accordingly had little occasion to take stock of their established practices. But with the growth of synthetics some producers are beginning to ask whether natural rubber as we know it is good enough to compete successfully with the products of the synthetic rubber industry.

Evidence of a new approach to the industry's problems is afforded by the report under review. In 1944 when plans for the recovery of Malaya began to take shape a conference of rubber manufacturing and trade organisations in Great Britain was convened by the London Advisory Committee for Rubber Research (Ceylon and Malaya) to formulate recommendations which would enable growers to prepare and pack the bulk of their product in the form and quality most suitable for use by the manufacturers. The report now issued deals successively with the views of manufacturers, the question of establishing large scale plantation factories, and the possible alternatives to standard grades. Though these matters are considered primarily in relation to the restoration of the Malayan industry many of the conference's conclusions are valid for all rubber producing territories.

It is reassuring to note that most manufacturers agree that the main product from estates should continue to consist of ribbed smoked sheet. Attention is drawn however to other forms and types which offer theoretical advantages but which have so far not been thoroughly tested and approved. It is emphasised throughout the report that the search for superior forms must be initiated by the producer who will in future be expected to keep abreast of the changing technical needs of the manufacturer. As examples of new types which might be developed for special purposes the committee mentions softened rubber, purified rubber, powdered rubber, and rubber-carbon black mixtures of the type developed during the war by the producers of synthetic rubber.

Methods of packing are, on the whole, unsatisfactory and require further study. The most generally favoured type of package at present is the "bare-back" bale but this form is not entirely free from objection. Some manufacturers have expressed a desire for smaller packages similar to those employed by the American producers of GR.S.

A major part of the report deals with the long-range question of establishing in Malaya central factories in which large tonnages of uniform rubber could be prepared under technical supervision. On this question there is a divergence of opinion and the majority view is set out in the report side by side with the minority view. Both parties agree however that convincing evidence for or against large central factories can only come from an actual trial. The report concludes with an interesting appendix contributed by Mr. W. G. Birnie of the Soc. Indochinoise de Plantations d' Heveas on his experience of large scale sheet manufacture in Indo-China.

Many who read this publication will recall that a commentator recently expressed the view that natural rubber will gradually become a smallholders' product if the industry fails to "keep one jump ahead in technical progress." The authors of the report have developed this theme by indicating some of the directions in which technical advances are possible and necessary. It remains to be seen whether the industry will take their suggestions seriously.—M. W. P.

MEETINGS

RUBBER RESEARCH SCHEME (CEYLON)

Minutes of the seventy-eighth meeting of the Rubber Research Board held at the Ceylon Chamber of Commerce, Colombo, at 2-30 p.m. on Monday, 21st January, 1946.

Present.—Mr. L. J. de S. Seneviratne, C.C.S. (in the chair), Mr. T. Amarasuriya, M.S.C., Mr. W. Neal de Alwis, Mr. W. P. H. Dias, J.P., Mr. A. M. Clement Dias, Mr. F. J. C. de Mel, Mr. S. L. Gaddum, Mr. F. H. Griffith, M.S.C., Col. K. D. H. Gwynn, Mr. R. J. Hartley, Mr. R. C. Kannangara, M.S.C., Mr. R. C. L. Notley, Mr. F. A. Obeyesekere, Mr. E. J. O. Richardson and Mr. G. R. Whitby, M.S.C.

Mr. M. W. Philpott, Acting Director, was present by invitation.

An apology for absence was received from Col. C. J. D. Lanktree, C.C.S., Deputy Financial Secretary.

1. Minutes

Draft minutes of the meeting held on 29th October, 1945, which had been circulated to members, were confirmed and signed by the Chairman.

2. Board

The Chairman reported the following changes in membership since the last meeting :—

(a) Mr. F. H. Griffith, M.S.C. had been renominated as a representative of the Planters' Association of Ceylon for 3 years from 16th November, 1945.

(b) Mr. F. A. Obeyesekere had been renominated as a representative of small-holders for three years from 25th November, 1945.

(c) Mr. L. P. Gapp had resigned on his departure from Ceylon and Mr. E. J. O. Richardson had been nominated in his place by the Ceylon Estates Proprietary Association for three years from 10th December, 1945.

The incoming members were welcomed, and Mr. Gapp thanked for his services.

3. Decisions by Circulation of Papers

Passages for Dr. and Mrs. L. A. Whelan.—Reported that a majority of members had agreed to provide air passages to New Zealand for Dr. and Mrs. L. A. Whelan. Dr. and Mrs. Whelan had accordingly left by air on 31st December.

4. Acting Director's Report for the 3rd Quarter 1945

This was approved.

5. Proposals for Future Development

Agreed that further representations be made to the Hon'ble the Minister for Agriculture and Lands emphasising the need for an increased cess.

6. Smallholdings Committee

Recommendations made at meeting held on 4th January, 1946 :—

(a) Rubber Commissioner's Purchasing Depots.—Reported that, as recommended by the Committee, the Acting Director and a member of the Committee had interviewed the Rubber Commissioner. The Acting Director had subsequently written to him setting out the Committee's views on the desirability of retaining the depots. The action taken was approved.

(b) Advances to Rubber Instructors for repair of cars.—Agreed that no advances be given for repair of cars.

The minutes were adopted.

7. Experimental Committee

Recommendations made at meeting held on 4th January, 1946 :—

(a) Visiting Agent's Report — Dartonfield :—

Machinery.—The V. A.'s comments and the Committee's recommendations regarding the recent breakdowns of the Ruston engine, etc. were noted. It was agreed that the Visiting Engineers be asked to inspect the engines and report on the breakdowns and on the competence of the Engine-Driver Mechanic.

Tapping.—The recommendation that the Double-Four tapping system be adopted after the next wintering period was approved.

The V. A.'s report was adopted.

(b) Sharing services of a midwife with Mukalana Estate.—The recommendation was approved that the services of a midwife be shared with Mukalana Estate.

(c) Criticisms of proposals for future development.—It was noted that the Committee had agreed with the comments of the scientific staff in regard to the criticisms made by outside organisations on the Board's ten-year research programme.

The minutes were adopted.

8. Accounts

(a) Receipts and Payments Account for the 3rd quarter 1945 — was approved.

(b) Dartonfield, Nivitigalakele and Hedigalla accounts for August and September 1945 — were tabled.

(c) Fixed Deposits.—Reported the transfer to current account of two fixed deposits amounting to Rs. 40,000.

9. Staff

(a) Botanist.—Reported that Mr. C. C. T. Sharp, Botanist, had left for Malaya on 10th November, 1945.

(b) Geneticist.—Reported that Dr. C. E. Ford, Geneticist, had given six months' notice of resignation. In view of a request from the Secretary of State for the Colonies it was agreed that the period of notice be waived and that Dr. Ford be released from his contract immediately.

(c) Secretary-Accountant.—An application from Mr. C. D. de Fonseka, Secretary-Accountant, for ten months' leave from 1st April, 1946 was considered and approved.

(d) Junior Staff :—

1. *Computer.*—Reported the resignation of Mr. D. M. Rodrigo Computer, on 31st December, 1945.

2. *Rules of Junior Staff Association.*—The rules of the Junior Staff Association were tabled and approved.

10. Publications

The Annual Report for 1944 was tabled.

The meeting terminated with a vote of thanks to the Chamber of Commerce for the use of the room.

RUBBER RESEARCH SCHEME (CEYLON)

Minutes of the seventy-ninth meeting of the Rubber Research Board held in Room No. 202, Galle Face, Secretariat, Colombo, at 2-30 p.m., on Monday, 1st April, 1946.

Present.—Mr. L. J. de S. Seneviratne, C.C.S. (in the chair), Col. C. J. D. Lanktree, C.C.S. (Deputy Financial Secretary), Mr. Noel de Silva, Mr. A. M. Clement Dias, Mr. F. A. Obeyesekere, Mr. R. C. L. Notley, Mr. F. J. C. de Mel, Mr. F. H. Griffith, M.S.C., Mr. W. H. Attfield, Mr. W. P. H. Dias, J.P., Mr. R. J. Hartley, Mr. Neal de Alwis, Mr. E. J. O. Richardson, and Mr. E. W. Whitelaw.

Mr. T. E. H. O'Brien, Director, was present by invitation.

1. Minutes

Draft minutes of the meeting held on 21st January, 1946, which had been circulated to members, were confirmed and signed by the Chairman.

2. Board

The Chairman reported the following changes in membership since the last meeting :—

(a) Mr. Noel de Silva had been nominated by the Low-Country Products Association for three years from 19th March, 1946, in place of Mr. Thomas Amarasuriya whose period of membership had expired.

(b) Mr. R. P. Gaddum had resigned and Mr. W. H. Attfield had been nominated in his place by the Ceylon Estates Proprietary Association with effect from 6th March, 1946.

(c) Mr. E. W. Whitelaw had returned to the Island and resumed his seat with effect from 21st March, 1946, relieving Col. K. D. H. Gwynn.

The incoming members were welcomed and retiring members thanked for their services.

3. Experimental Committee

Recommendations made at meeting held at Dartonfield on 25th March, 1946 :—

(a) Appointment of Acting Visiting Agent.—Decided to invite Col. K. D. H. Gwynn to visit the estates during the absence of Mr. P. R. May.

(b) Tenders for Secretary-Accountant's bungalow.—Decided to award the contract to the lowest tenderer, Mr. Hector de Silva. A vote for the cost, Rs. 34,953, was approved.

(c) Rubber Technologist.—Decided that facilities be given for Dr. A. Sundaralingam, the newly-appointed Rubber Technologist of the Department of Industries, to make use of the laboratories at Dartonfield, pending the provision of laboratory accommodation in Colombo.

(d) *Excesses and Savings on estate votes for 1945.*—Supplementary votes were approved to cover nett over-expenditure as follows :—

Dartonfield normal working	Rs. 4,060
Nivitigalakele upkeep of nurseries	Rs. 1,957

(e) *Hedigalla cart road.*—Authority was given for construction of the fourth ½-mile of the road at rates to be approved by the Committee.

(f) *Factory Mechanic.*—Decided to appoint an additional mechanic.

The minutes were adopted.

4. Future Development

The Chairman reported correspondence with the Minister for Agriculture and Lands regarding the increased cess for future development.

5. Acting Director's Report for the 4th Quarter 1945

This was adopted.

6. Accounts

(a) *Receipts and Payments Account for the 4th quarter 1945* — was adopted.

(b) *Estate accounts for October, November and December, 1945*—were tabled.

(c) *Supplementary votes.*—The following inclusive votes were approved to cover constructional work previously sanctioned :—

1.	Chummery (Dartonfield) ...	Rs. 34,000
2.	Peons quarters (Dartonfield) ...	„ 12,137
3.	K. P.'s quarters (Hedigalla) ...	„ 4,750

7. Staff

(a) *Director.*—The resumption of duties by Mr. T. E. H. O'Brien, Director, on 12th February, 1946 was reported. Mr. O'Brien's intention to retire on 31st March, 1947 was noted with regret, and it was decided to take immediate steps to appoint a successor. A Committee consisting of Messrs. R. C. L. Notley, F. A. Obeyesekere, Noel de Silva and E. W. Whitelaw was appointed to recommend a suitable salary scale.

(b) *Smallholdings Propaganda Officer.*—Reported that Mr. W. I. Pieris, Smallholdings Propaganda Officer, had been granted 1 month's sick leave from 20th March, 1946.

(c) *Secretary-Accountant.*—Reported that Mr. C. D. de Fonseka's leave had started from 18th March, 1946; most of his duties had been taken over by the Chief Clerk, Mr. B. Tillekeratne, and the remainder distributed among the clerical staff. The terms of a service agreement for Mr. De Fonseka were approved.

(d) *Estate Superintendent.*—Decided to offer re-engagement to Mr. G. P. N. de Silva, Estate Superintendent, when his present service agreement terminates on 12th October, 1946.

(e) *Junior Staff.*—The Experimental Committee was asked to report on applications for salary increases by members of the staff.

(f) *War Funds.*—Decided to terminate the arrangement for the collection of monthly contributions by deductions from salaries. The Chairman reported that a total of Rs. 5,627.43 had been collected: the junior staff contribution being Rs. 2,000.16. Members congratulated the staff on the result.

The meeting terminated with a vote of thanks to the Chair.

RUBBER RESEARCH SCHEME (CEYLON)

Minutes of the eightieth meeting of the Rubber Research Board held in the Committee Room of the Ceylon Chamber of Commerce, Colombo, at 2-30 p.m. on Monday, 24th June, 1946.

Present.—Mr. L. J. de S. Seneviratne, C.C.S. (in the chair), Mr. H. E. Peries, C.C.S. (Acting Deputy Financial Secretary), Mr. W. H. Attfield the Hon'ble Mr. G. E. de Silva, M.S.C., Mr. W. P. H. Dias, J.P., Mr. W. Neal de Alwis, Mr. F. J. C. de Mel, Mr. A. M. Clement Dias, Mr. F. H. Griffith, M.S.C., Mr. A. W. Harrison, Mr. R. C. L. Notley, Mr. F. A. Obeyesekere, Mr. E. J. O. Richardson, Mr. Noel de Silva, and Mr. E. W. Whitelaw.

Mr. T. E. H. O'Brien, Director, was present by invitation.

1. Minutes

Draft minutes of the meeting held on 1st April, 1946, which had been circulated to members, were confirmed and signed by the Chairman.

2. Board

The Chairman reported the following changes in membership since the last meeting :—

(a) Mr. H. E. Peries, Acting Deputy Financial Secretary, had been nominated to represent the Financial Secretary in place of Col. C. J. D. Lanktree, with effect from 26th April, 1946.

(b) Mr. R. J. Hartley had resigned and Mr. A. W. Harrison had been nominated in his place by the Rubber Growers' Association with effect from 15th April, 1946.

The Chairman also reported that notice of resignation had been received from Mr. E. W. Whitelaw who was about to leave Ceylon. He thanked Mr. Whitelaw for his services to the Board over a period of 14 years and the keen interest he had taken in Research Scheme matters. It was unanimously decided to place on record the Board's appreciation of Mr. Whitelaw's services.

Votes of thanks to other retiring members were adopted and new members welcomed.

3. Salary Scales for Director and Technical Officers

Report of Sub-Committee appointed at meeting held on 1st April, 1946 :—

(a) Advertisement for Director.—Reported that the salary scale of Rs. 27,000 — Rs. 600 — Rs. 33,000 recommended by the Committee, had been approved by circulation of papers. An advertisement had been forwarded to U. K. for insertion in suitable publications.

(b) Provident Fund.—The recommendation was approved that the rate of contribution to the Staff Provident Fund be increased to 10 per cent by the employer and employee, with effect from 1st January, 1947.

(c) Technical Officers.—The recommendation was approved that the salary scale for officers recruited from abroad should remain unchanged, and that officers recruited locally be placed on the same scale.

(d) Deputy Director.—The recommendation that a deputy Director be appointed from among the staff and should receive a monthly allowance was postponed for later consideration.

4. Experimental Committee

Recommendations made at a meeting held on 10th June, 1946 :—

(a) Power supply.—On the advice of the Consulting Engineer the Committee recommended that a new 80-90 h.p. engine be installed. An estimate for installing a 80-90 h.p. National engine and 55 K/W. generator was approved.

(b) Estate building programme for 1946.—The following increased votes were approved :—

	Present Vote	Vote recommended
School and Creche	Rs. 7,000	Rs. 8,950
Schoolmaster's quarters	„ 5,000	„ 5,972
K. P's quarters, Hedigalla	„ 4,750	„ 5,972
Rice and toolstore, Nivitigalakele	„ 3,000	„ 5,263
Repairs to estate buildings	„ 525	„ 1,213
Repairs to Gallawatta bungalow	„ —	„ 1,436

(c) Estate School.—Decided to advertise for a Schoolmaster who could teach in Sinhalese and Tamil.

(d) Creamed latex.—The proposal was approved that latex supplied by an outside company should be creamed at Dartonfield pending construction of the firm's own creaming plant.

(e) Junior Staff Salary Scales.—The Committee reported that salary scales had been revised in 1943 and that there was no case for further revision. The report was adopted.

The minutes were adopted.

5. Annual Report for 1945

The Chairman's and Director's reports were considered and adopted.

6. Accounts

(a) Estate accounts for January, February and March 1946 — were tabled.

(b) Balance Sheet and accounts for 1945.—Decided to postpone consideration until the Auditors' report is available.

(c) Supplementary votes and revotes :—

1. Supplementary votes to cover items over-expended in 1945 totalling Rs. 18,425 were approved. It was noted that the over-expenditure arose mainly from the increased cost of war allowance.

2. Unexpended balances of votes on capital account were revoted as summarised below :—

Laboratory equipment	Rs. 11,363
Buildings	„ 13,368
Hedigalla cart road	„ 40,156

7. Staff

(a) Director.—A report on the Director's health was considered, and it was decided that he be permitted to retire whenever it suited him.

(b) Smallholdings Propaganda Officer.—Reported absence on sick leave for one month from 24th April.

(c) Re-engagement of Estate Superintendent.—Terms of engagement recommended by the Experimental Committee were considered, and a new salary scale was approved.

(d) *Appointment of Botanist, Mycologist, and Research Assistants.*—A Selection Committee, consisting of Messrs. R. C. L. Notley, W. P. H. Dias, Noel de Silva, W. Neal de Alwis and E. J. O. Richardson, with the Director as convener, was appointed to consider applications for the posts.

(e) *War Allowances.*—After considering a recommendation of the Experimental Committee it was decided that the 15 per cent war allowance payable to the senior staff should be subject to a minimum of Rs. 200 per month for married officers and Rs. 180 for bachelors.

8. Publications

The following publications were tabled :—

1. *Combined 3rd and 4th Quarterly Circulars* for 1945.
2. Supplement to Advisory Circular No. 20.

The meeting terminated with a vote of thanks to the Chamber of Commerce for the use of the Committee Room.

RUBBER RESEARCH SCHEME (CEYLON)

Minutes of the eighty-first meeting of the Rubber Research Board held in Room No. 202, Galle Face, Secretariat, Colombo, at 2-30 p.m. on Wednesday, 17th July, 1946.

Present.—Mr. L. J. de S. Seneviratne, C.C.S. (in the chair), Mr. H. E. Peries C.C.S. (Acting Deputy Financial Secretary), Mr. W. H. Attfield, Mr. W. Neal de Alwis, Mr. W. P. Dias, J.P., Mr. Noel de Silva, Mr. A. M. Clement Dias, Mr. F. H. Griffith, M.S.C., Mr. A. W. Harrison, Mr. F. J. C. de Mel, Mr. R. C. L. Notley, Mr. F. A. Obeyesekere, and Mr. R. J. O. Richardson.

Mr. M. W. Philpott Acting Director, was present by invitation.

1. Minutes

Draft minutes of the meeting held on 24th June, 1946, which had been circulated to members, were confirmed and signed by the Chairman.

2. Board

The Chairman reported the following changes in membership since the last meeting :—

(a) The Hon'ble Mr. G. E. de Silva, M.S.C. had been re-nominated to represent the State Council for a further period of 3 years, with effect from 13th July, 1946.

(b) Mr. Simon Abeywickrama, M.S.C., had been nominated to represent the State Council in place of Mr. G. R. Whitby who had resigned, with effect from 1st March 1946.

The Chairman stated that both members were engaged in the State Council that afternoon but he welcomed them on behalf of the Board.

1. Staff

(a) *Director.*—The Chairman said that members would regret that Mr. O'Brien was not well enough to be present.

The report of the Sub-Committee appointed to consider Mr. O'Brien's terms of retirement was read out. Under the Ordinance as at present framed the Board had no power to grant either a pension or a gratuity.

The Sub-Committee therefore recommended that Mr. O'Brien's agreement should not be terminated now but that he should be given sick leave on full pay until 19th April, 1948. It was further suggested that steps should be taken to have the Ordinance suitably amended to enable the Board to give Mr. O'Brien a pension with retrospective effect from the date of retirement. These recommendations were approved.

The Chairman stated that Mr. O'Brien had been advised by his doctor to cease work without delay and return to England by air. The provision of air passages for Mr. and Mrs. O'Brien was approved.

The following record was made of Mr. O'Brien's past services to the Board :—

"Mr. T. E. H. O'Brien was appointed Chemist to the Rubber Research Scheme on 19th December 1921 and later became Chief Technical Officer. The Rubber Research Scheme (Ceylon) was constituted in 1932 by Ceylon Ordinance, Chapter 302, and the new Board of Management took over the staff and assets of the former Research Scheme. Mr. O'Brien was appointed Director in January 1932, in competition with a large number of overseas candidates. He resigned his post with effect from 5th July, 1946, owing to ill-health, and several years before the normal retiring age for European employees in Ceylon.

Mr. O'Brien has been in charge of the work of the Research Scheme during a period of expansion and development. Salaried staff increased from 15 in 1932 to 66 in 1945, and recurrent annual expenditure from Rs. 90,894 to Rs. 392,632.

As an administrative officer he rendered exceptional services to the Rubber Research Scheme."

(b) Acting Director.—It was confirmed that Mr. W. W. Philpott had taken over the administration of the Scheme from the retiring Director and that he would combine the duties of Chemist and Director until a new permanent Director was appointed.

(c) Staff Vacancies.—The report of the Selection Committee was approved and the Chairman was authorised to offer the posts of Mycologist and Botanist to the selected applicants.

It was noted that the response to the advertisement for Ceylonese Research Assistants had been disappointing and it was agreed that the Board should again invite applications. Meanwhile the two applicants selected by the Committee should be called for interview.

(d) Hedigalla K. P.—It was agreed that the Hedigalla K. P. should be granted one month extension of sick leave on half-pay if still unfit for work on 1st August.

4. Increase in Research Cess

The Chairman read a letter from the Minister that the Executive Committee of Agriculture and Lands had approved the cess being increased from 12½ cents to 25 cents per 100 lbs.

5. Any Other Business

Mr. A. M. Clement Dias was invited to serve on the Experimental Committee during Mr. W. P. H. Dias' absence from Ceylon.

The meeting then terminated.

London Advisory Committee for Rubber Research (Ceylon and Malaya).

Member nominated by the Colonial Advisory Council of Agriculture and Animal Health:

Sir Harold Tempany, C.B.E.

Member nominated by the Government of Ceylon:

Mr. L. Lord

Member nominated by the Governments in British Malaya:

Mr. J. Lornie, C.M.G.

Members representing Malayan planting interests—nominated by the Rubber Growers' Association:

Mr. P. J. Burgess (Chairman).
Mr. J. W. M. Kennedy.
Mr. Eric Macfadyen.

Members representing Ceylon planting interests—nominated by the Rubber Growers' Association:

Mr. G. H. Masefield.
Mr. George Brown
Mr. H. W. Horner.

Member representing Manufacturing interests:

Lieutenant-Colonel J. Sealy-Clarke.

Ex-Officio Members:

Sir H. A. F. Lindsay, K.C.I.E., C.B.E., Director of the Imperial Institute.
Professor V. H. Blackman, Director of the Botanical Laboratories, Imperial College of Science and Technology.
Dr. S. P. Wiltshire, Director of the Imperial Mycological Institute.
Dr. W. G. Ogg, Director of the Rothamsted Experimental Station.

Secretary:

Mr. R. C. Walker (acting).

The Technical Sub-Committee consists of members of the Advisory Committee with the following co-opted Members:

Mr. G. Martin (Superintendent of Rubber Investigations).
Mr. G. E. Coombs.
Mr. L. J. Bennett
Dr. Samuel Pickles
Dr. J. R. Scott
Dr. W. C. Davey
Prof. R. G. H. Clements

STAFF.

Mr. G. Martin, B.Sc., A.R.I.C., F.I.R.I.
Mr. H. C. Baker, M.Sc., A.R.I.C., A.I.R.I.
Mr. W. G. Wren, B.Sc., A.R.C.S.

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